

## Forest Health Alert

### Pine Shoot Beetle in Missouri

The pine shoot beetle (PSB), *Tomicus piniperda*, a bark beetle pest of pines in Europe and Asia, was detected for the first time in Missouri in 2012. PSB adults have since been collected at multiple locations in northeastern Missouri through the use of beetle traps monitored by the Missouri Department of Agriculture. PSB was first detected in the U.S. in 1992 in Ohio, but has now been detected in 19 states to our north and east including Iowa and Illinois and in two Canadian provinces. Current information on the pine shoot beetle in Missouri is available at:

<http://mda.mo.gov/>

#### Threat to Forests

The PSB is not a severe forest threat like emerald ash borer or thousand cankers disease, but it has the potential to be a significant pest in stressed pine stands. PSB is a bark beetle that primarily attacks pines, and like other bark beetles, it reproduces in galleries under the bark of the main stem and major limbs. It is a secondary colonizer in that regard, because it only successfully attacks severely stressed, dying, or recently killed pines.

But unlike most bark beetles, PSB also has a shoot tunneling period during the adult stage. It is a primary colonizer for shoot tunneling, because it readily attacks healthy pines. Where there are severely stressed or recently dead pines in which PSB populations can build, the beetles can



Pine shoot beetle adult tunneling in pine shoot

(Photo: Steve Passoa, Forestry Images)

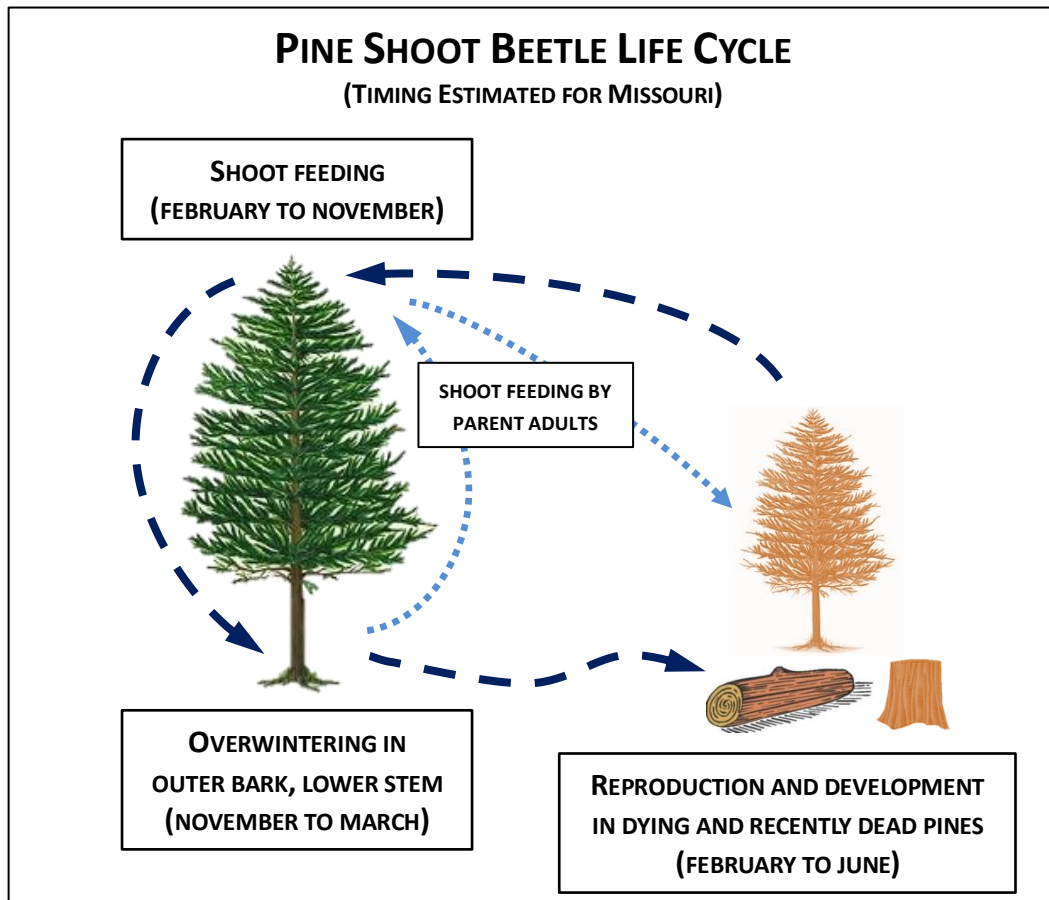
significantly damage shoots on healthy trees and reduce tree growth. It is considered the most important pine bark beetle in Europe, where losses as much as 45% in annual growth volume have been recorded.

In North America, PSB is most commonly found in Scots pine (*Pinus sylvestris*), but it can successfully shoot-feed and breed in several North American pine species. PSB has been considered primarily a Christmas tree pest in North America, because of its shoot feeding behavior. Nevertheless, since its detection in the U.S., there have been

concerns raised about what impacts PSB might have when it eventually reaches the range of southern pines, warmer southern climate, and areas with ongoing harvests and large amounts of slash available as brood hosts. Major damage events to pines such as wind or ice storms also could potentially result in buildup of PSB populations.

## PSB Life Cycle

The pine shoot beetle has one generation per year and an uncommon life cycle for a bark beetle with 3 distinct phases. 1) The adults overwinter within the rough outer bark in the lower one foot of stem on live trees, not in tunnels under the bark. 2) Adults emerge in late winter, earlier than most native bark beetles, when daily high temperatures reach greater than 50-55 °F. They then fly to severely stressed or recently dead trees and recently cut logs, stumps and slash, where they tunnel under the bark in the phloem and reproduce. 3) Larvae of the next generation develop within galleries in the phloem, emerge as new adults in spring and early summer, and fly to green shoots of healthy pines. They tunnel within shoots until freezing weather in fall induces them to drop to overwintering sites on the lower stem. A single beetle will create several shoot tunnels. Adding to the life cycle complexity is additional shoot feeding by “parent adults” (overwintered adults) in spring when they shoot-feed prior to reproduction and after having constructed one or more egg galleries. A schematic diagram is presented here of the PSB life cycle with timing expected for Missouri.



## Regulation and Management

A federal quarantine and various state quarantines (county-by-county or statewide) have been implemented in states where PSB has been detected to prevent the spread of this pest. The Missouri Dept. of Agriculture implemented a quarantine in 2012 that affects only counties where PSB has been detected. Pine nursery stock, Christmas trees, lumber with bark attached, and other raw pine materials are regulated. Pine producers, transporters and processors can enter into a

compliance agreement that allows movement of regulated articles from quarantined areas when specific conditions are met.

The primary management approach for PSB is the use of cultural practices to reduce availability of potential brood sites. In Christmas tree plantations, this includes tactics such as cutting stumps flush with the ground, destroying cull trees and stumps prior to spring, and setting out freshly-cut pine trap logs in spring to attract PSBs and destroying the logs soon after.

Appropriate timing of pine management activities can allow for harvest and transport of pines with reduced risk of spreading PSBs. A window of time for harvesting and transporting pine logs exists from July to October when PSBs are feeding in shoots. Movement of pine logs from a PSB-infested area during November to June would have a high risk for transporting PSBs and requires special handling as specified in a compliance agreement.

Pine seedlings are very rarely attacked by PSB. State and federal compliance agreements allow movement of pines that are less than 36 inches tall and less than 1 inch stem diameter at the soil line.

### **The Future of PSB in Missouri**

More than 20 years of research, regulation and management experience in the U.S. is available upon which to draw guidance for regulating and managing PSB in Missouri. However, we have some unique challenges. Missouri is located on the southern edge of the PSB range in the U.S., although PSB's distribution worldwide extends to more southern latitudes elsewhere. As the PSB expands its range farther south here, it is unknown how much the warmer climate will affect its biology and the annual timing of management activities. It is also unknown how PSB will behave when it enters the range of shortleaf pine (*P. echinata*) in southern Missouri and beyond. Studies in Ohio confirm that PSB can reproduce in shortleaf pine logs and can feed in shortleaf pine shoots. Another consideration is the occasional heavy defoliation by pine sawflies in southern Missouri. It's unknown if sawfly defoliation can stress shortleaf pines severely enough to allow PSBs to reproduce in them and thus build up damaging populations.



Thinning crowns due to  
pine shoot beetle damage  
(Photo: Richard Hoebeke, Forestry Images)

### **Additional Information**

[http://entnemdept.ufl.edu/creatures/trees/beetles/pine\\_shoot\\_beetle.htm](http://entnemdept.ufl.edu/creatures/trees/beetles/pine_shoot_beetle.htm)

[http://www.aphis.usda.gov/plant\\_health/plant\\_pest\\_info/psb/index.shtml](http://www.aphis.usda.gov/plant_health/plant_pest_info/psb/index.shtml)

[http://www.aphis.usda.gov/plant\\_health/plant\\_pest\\_info/psb/prs.shtml](http://www.aphis.usda.gov/plant_health/plant_pest_info/psb/prs.shtml)



Rob Lawrence, Missouri Dept. of Conservation – June 2013